ing the necessary reduction in speed, — about one turn of the car-wheels to ten or twelve of the motor. A single pair of gears would be sufficient for light work, but for climbing hills a single reduction would make the strain on the teeth too great. The efficiency of spur-gears is very great, and, when properly constructed, there is very little noise or jar. A much more compact arrangement, though a less efficient one, has been adopted by Mr. Reckenzaun. He uses a simple worm gearing, where the motor-shaft and car-axle are at right angles to each other. Such an arrangement has been generally avoided because of the supposed great loss through friction. From his own experiments, however, Mr. Reckenzaun concludes that the losses are greatly overestimated, and by taking especial care in the lubrication he has obtained efficiencies that compare favorably with the efficiency of spur-gears. But it is in the storage-battery that the greatest interest of the system lies. It does not seem to be any great improvement over the present battery in weight — the cells on a car weigh about two tons — or in efficiency, but it is claimed that the durability will be greater than that of the ordinary type. The plates are made by forming by pressure cylinders of active material, a sixth of an inch in diameter, and about an inch and a quarter long, putting them in a mould and casting lead around them. The cylinders are only about a tenth of an inch apart, while the thickness of the lead in which they are embedded is one-eighth of an inch. The advantages of this form of plate lie in the fact that the active material is held firmly in its place, and that the greater part of the expansion is in the direction of the length of the cylinders: so the chance of buckling is less, while a large active surface is offered to the action of the acid. The total weight of the car, with thirty passengers, is about seven tons and a half, and about five electrical horse-power is required to draw it on a level at a velocity of seven to eight miles an hour. On a hill with a grade of five per cent, the motors absorb twenty electrical horse-power. The car described has been built by Messrs. Stephens, Smith, & Co., and is for use in Melbourne, Australia.

SNOW-STORMS ON ELECTRIC ROADS. — The winter has thus far been so mild that electric railroads have hardly had a fair test as to their capability of working under adverse circumstances. One snow-storm in St. Joseph failed to stop the electric line there; and now we have news of a blizzard at Davenport, Io., through which the Sprague cars ran without interruption. In this last case the snow — of the heavy, damp variety — covered the streets to a depth of four or five inches, with drifts in places across the tracks. While this is satisfactory enough, it must be remembered that it is not the wet, slushy snow that is most to be feared, but the dry variety, that cakes on the track and prevents contact being made between the wheel and rail. The only safeguard against trouble from this last cause is to keep cleaning-cars going as long as the snow-storm continues. There is another difficulty, especially when a heavy overhead wire is used, and this is from the formation of a coating of ice or sleet, preventing the trolley from touching the wire. While in the two cases cited there has been nothing but encouragement, yet there have been rumors of troubles that occurred at Washington, at Lynn, and perhaps at Brockton, on account of snow and ice. These were no doubt caused by insufficient experience, and from neglecting common precautions, and were only small matters at the most, but they at least show that precautions must be taken.

APPLICATION OF ELECTRIC MOTORS TO MINING. — At the Drane Colliery, near Osceola, Clearfield County, Penn., Mr. F. M. Lechner has devised a most interesting application of motors to mining-work. A ten-horse-power Sprague motor is mounted on a truck running on rails, so it can be easily moved from one place to another. The weight of the machine is something less than a thousand pounds. The cutter to be operated is set in position in the space to be cleared, and is connected to the motor by a $\frac{5}{8}$-inch rope belt, movable pulleys on jack-screws being so adjusted that the cutter can be operated at any angle from the motor. The latter is about thirty feet from the cutter, the tension of the belt being adjusted by moving the truck one way or the other. The machine runs easily and cuts well. By this plan three cutters can be worked from one motor, two being adjusted while the third is at work, the motor being moved from one to the other as it is needed. It was found, on a preliminary trial of this apparatus, that by its use two men could excavate one hundred tons in ten hours, and that they can move the cutter as often as desired without any auxiliary aid. The efficiency of the dynamo and motor are each over ninety per cent, and, allowing ten per cent loss on the line, between seventy and seventy-five per cent of the power delivered to the dynamo can be called on at the motor for work. It has been estimated that the cost of equipping a mine with electric power is only half of that of compressed air, while the working expenses are about in the same proportion.

SCIENTIFIC NEWS IN WASHINGTON.

Some Habits of the Omahas. — Electrical Conductivity of Glass. — Fish Commission Experiments. — The Woman's Anthropological Society. — The Survey for Irrigation. — Indian Relics from Florida.

Some Habits of the Omahas.

The following statements have just been made by an Omaha Indian (Samuel Fremont) to Rev. J. Owen Dorsey: —

The Omahas used to blow the smoke of the pipe in six directions, up, down, and to the four winds, using a prayer in each case. The exact order in which the winds were addressed has been forgotten; but the smoker could pray to the being above first, if he wished, and then to the being below, or *vice versa*. The earth itself was spoken to as if it was a person. The formula was as follows: "One of you lies on his back [i.e., the earth], the other one sits above: both of you help me!" Then followed the petition, "Oh, ye who cause the four winds to reach a place, help ye me!"

White people think that the Omahas knew nothing about Wakanda (a higher power, the Mysterious Power) before the meeting of the two races; but that is not so. They had many old sayings, used before they met the white people, such as, "Wakanda has decided for him his own (child, descendant, etc.)," "Wakanda knew," and "Wakanda seems to have aided him." These were employed when an Indian met with unexpected good luck. But the Pawnees had many more sayings about Wakanda than the Omahas had.

Before the advent of the white people, the Omahas used to get the wild honey, which they called "bee-dung." Its present name is "bee-gum." They put the comb in a kettle, in which they let it melt and boil, skimming off the impurities. They used the sirup as the white people do molasses. Unless the bees were troublesome, they did not smoke them when they took the comb.

Electrical Conductivity of Glass.

Dr. C. Barus has just completed a protracted investigation on the effect of stress (traction torsion) on the electrical conductivity of glass at different temperatures between 100° and 360°. The question is of unique importance, because the conductivity of glass is wholly electrolytic. He finds that stress of the kind given materially increases conductivity; whence it follows that the time-rate at which molecular reconstruction takes place in glass is definitely greater when this substance is longitudinally extended or twisted than when it is free from such strain. The result has a direct bearing on the viscosity of the solid.

Fish Commission Experiments.

Marshall McDonald, United States fish commissioner, is making a comprehensive experiment in salt and fresh water aquariums. He has already constructed several aquariums on the lower floor of the building, and stocked them; and he is now building a large one, 120 feet long, under a separate roof. The commissioner said to the correspondent of *Science*, "I am going to bring the seashore to Washington, and assemble here a full representation of our marine life." He has sixty or seventy species already sporting in salt and fresh water tanks, one of the latter containing specimens of the earliest type of fresh-water fish, — the ganoids.

The Woman's Anthropological Society.

One of the active scientific societies of Washington, and one whose work is of peculiar interest in that it is carried on solely by the sex sometimes supposed "incapable of generalizing," is the Woman's Anthropological Society. Despite the temporary retire-

ment of the president, Mrs. T. E. Stevenson, who is well known for her personal work among the Zuñi, the society enters upon the fifth year of its existence with undiminished enthusiasm and vigor; Mrs. Sybil A. Carter (wife of the Hawaiian minister) and Miss Florence Spofford acting respectively as president and secretary. Two meetings were held during January. On the 5th the subject of discussion was "The Evolution of a Community (Amana)," as presented by Mrs. Anita Newcomb McGee. The author of the communication has been for several months engaged in investigating the communistic societies of the United States, nearly all of which she has visited. The more general results of her studies were laid before the American Association at Cleveland in August last. Some of the elements of success or failure in communistic organizations are obscure, and have seldom been perceived by writers on the subject; and these Mrs. McGee sought to develop and set forth by a study of the origin, growth, and relations to environment at every stage, of the most successful American community. The conclusions were in line with those stated at Cleveland, and summarized in the *American Naturalist* for September last. The meeting on the 19th was occupied in the presentation of a communication on "Russia and the Russians" by Mrs. Hunt, widow of the late minister to the Muscovite dominion. The habits, customs, and beliefs of the various classes of Russia were vividly portrayed; and the skill of artificers in certain Russian villages in the production of enamelled silver and other wares, etc., — arts handed down from generation to generation in Oriental fashion, and unknown elsewhere, — was illustrated by the exhibition of a collection of silver and fictile ware and unique textile fabrics.

The Survey for Irrigation.

Professor Thompson announces to the correspondent of *Science* that topographic parties of the United States Geological Survey engaged on the irrigation survey in New Mexico have completed their field-work for this season, and disbanded at Santa Fé.

An area of 3,500 square miles in the drainage basins of the Jemez and Rio Grande has been surveyed with sufficient detail to construct a map on the scale of two miles to an inch and contour interval of fifty feet.

This work has been under the immediate charge of Mr. Arthur P. Davis, who returns with most of his force to Washington to prepare final maps. One party, however, under charge of Mr. R. H. Phillips, will continue work in the lower Rio Grande valley, near El Paso, Tex., during the entire winter. A number of eligible sites for reservoirs and diverting dams have been located. It is estimated that sufficient water can be stored in the mountains about the head waters of the Jemez River to irrigate 150,000 acres of land where now the waters only serve about 4,000 acres.

Indian Relics from Florida.

Dr. Thomas Featherstonhaugh, a grandson of the famous pioneer geologist, has just returned from a visit to Florida, and has brought back an interesting collection of aboriginal remains. He thoroughly examined a mound of damp sand on the shore of Lake Apopka, about the geographical centre of the State, and farther south than any previous researches of the kind. The mound was fifty feet in diameter and fourteen feet high, and was covered with a dense growth of palmetto and other trees. It was found to be full of fragmentary bones and pottery, so numerous that Dr. Featherstonhaugh estimates that there could have been no less than four hundred bodies deposited there. A few Venetian beads near the top indicated intrusive burials, but below four feet there were no evidences of any intercourse with whites. Four shapely hatchets were recovered, also a charm-stone, and numerous specimens of decorated pottery. The whole find was presented to Major Powell, and by him turned over to the Museum.

NOTES AND NEWS.

STANLEY'S letter to Tippo-Tip, which was recently published in the daily papers, contains no new information besides that which was conveyed in the recent telegrams. Stanley had succeeded in reaching Emin, and had returned to the Kongo in order to look after his rear guard. He was anxious to see Tippo-Tip, and invited him to meet him at some distance from the Kongo, where he encamped. He intended to return to Emin. It was stated before, that Stanley's letters were detained for some unexplained reason at Stanley Falls Station, while the latest telegram said that there were no other letters besides the one mentioned, addressed to Tippo-Tip. The full information sent from Zanzibar has again proved incorrect, as was expected. The report of the arrival of a letter from Stanley had evidently been telegraphed to Zanzibar by way of London, where it was amplified and falsified, and came back through Reuter's agency. No reports on events in the Equatorial Province or on the upper Kongo coming from this source can claim any serious attention.

— The original portrait of Washington (right side of the face) by Gilbert Stuart, long thought to have been destroyed by the artist, seems to have been recognized in the hands of Dr. W. F. Channing of California, who inherited it from his distinguished father, Rev. William Ellery Channing, who obtained it from his uncle, Col. Gibbs. It is understood that both New York City and Chicago have made offers for it, to hang in their art galleries, and its ultimate destination is doubtful.

— Surgeon-Gen. Hamilton has had one of his expert assistants, Surgeon Kinyoun, carry on a series of experiments as to the effectiveness of new disinfectants. Phosphorus was the one taken for the chemical tests, with litmus-paper and micro organisms: and the conclusions arrived at were, "1st, that phosphoric pentoxide is a disinfectant to surfaces only; 2d, it has no penetrating power, and is altogether unfit for fumigation of any thing where penetration of the agent is desirable." So perishes the hope that the fumes of phosphoric pentoxide would be useful in extirpating the bacteria of disease.

— On the evening of Jan. 23 the Mathematical Section of the Philosophical Society held its forty-ninth meeting, elected officers, and heard and considered these papers: "A Brief Control for General Solutions of Normal Equations," by A. S. Flint; "On Napier's Logarithms," by Artemas Martin; "General Perturbations of the Minor Planets," by W. F. McK. Ritter.

— A bill has been introduced in the Legislature of Nebraska to provide for a geological survey of the State with special reference to economic purposes. It proposes co-operation with the United States Geological Survey. The professor of geology in the State University at Lincoln is made *ex-officio* State geologist, and the sum of five thousand dollars for each of two years is to be appropriated for the work.

— The War Department has granted to the Smithsonian Institution the privilege of erecting an astro-physical observatory on the heights of Arlington; its purpose being, as its name implies, the investigation of the physical constituents of the heavenly bodies.

— The bill for the establishment of a zoölogical park and museum stands much better in Congress than it did at the last session, and it looks at this moment as if the appropriation for the purchase of the land on Rock Creek would be granted. Professor Hornaday has made a strong impression on the committees which he has addressed, and has excited national emulation by contrasting this country with other lands in its neglect of opportunities to study its own natural history.

— The scientific bureaus of Washington are seeking more elbow-room. The ambition of the Geological Survey to have a new building ($600,000) is matched by that of the Smithsonian, which seeks an appropriation of $500,000 for the erection of a building in the other corner of the grounds. The plan contemplates a structure somewhat like the present, but without an interior court, and with two stories and a basement instead of one story.

— The National Museum has secured Col. James Stevenson's private collection of Indian relics, entirely Pueblo. It contains several hundred pieces, among them an example of pottery for which Tiffany recently offered $250.

— Experiments are being made at Wheeling, W.Va., with a view to the utilization of natural gas as a fuel in the smelting of iron ore.